TACTICAL MOBILITY:

ORGANIZING ENGINEERS FOR AN ALL-ARMS PROBLEM

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This monograph analyzes the ability of U.S. Army engineers to organize at the division level and support tactical offensive operations on the contemporary battlefield. The analysis is conducted in light of the Soviet experience in organizing for maneuver-oriented offensive operations. The study first examines the nature of tactical mobility and its implications for conducting maneuver warfare. This section concludes that mobility is not a function of one arm within a combined arms force. Rather, mobility is an effect of several elements. The organizational element of mobility is influenced by tactical unity. Tactical unity and the role of the engineer on the combined arms team are then established as the focus for the study. A review of Soviet engineer organizations from an historical and doctrinal perspective then reveals the

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source of their strength -- specialization, flexibility, standardization of combined arms elements according to function within offensive operations, and an all-arms approach to the problem of mobility. This section focuses on the Soviet experience with such tactical organizations as the mobile obstacle detachment, movement support detachment, engineer reconnaissance patrol and the obstacle clearing detachment. The monograph then assesses the U.S. Army's mobility operations. An historical and doctrinal investigation reveals severa trends which characterize our approach. We have generally relied upon the engineers to perform critical mobility tasks (countermine, counterobstacle, gap crossing, etc.) and have always experienced a shortage of tactical bridging and adequate minefield breaching doctrine and equipment. An analysis of lessons learned at the NTC and current training guidance established in many U.S. divisions reveals other more critical problems.

By comparing the organizations and capabilities of the Soviets, who have a long-standing experience with a maneuver-based doctrine, with current U.S. attitudes and emerging doctrine, several recommendations evolve which can be acted upon now to enhance our ability to execute AirLand Battle doctrine with the forces in being. The need to emphasize tactical unity during all phases o offensive operations is critical to the development of standard practices such as combined arms counterobstacle teams. There is no question that we have failed to learn the lessons of our previous wars by neglecting tactical bridging and mine warfare doctrine and equipment. That is not, however, satisfactory reason for not doing the best with what we have to insure the viability of our doctrine in the next war.

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ABSTRACT

TACTICAL MOBILITY: ORGANIZING ENGINEERS FOR AN ALL-ARMS PROBLEM by MAJ Joseph Schroedel, USA, 67 pages.

This monograph analyzes the ability of U.S. Army engineers to organize at the division level and support tactical offensive operations on the contemporary battlefield. The analysis is conducted in light of the Soviet experience in organizing for maneuver-oriented offensive operations. The study first examines the nature of tactical mobility and its implications for conducting maneuver warfare. This section concludes that mobility is not a function of one arm within a combined arms force. Rather, mobility is an effect of several elements. The organizational element of mobility is influenced by tactical unity. Tactical unity and the role of the engineer on the combined arms team are then established as the focus for the study. A review of Soviet engineer organizations from an historical and doctrinal perspective then reveals the source of their strength -- specialization, flexibility, standardization of combined arms elements according to function within offensive operations, and an all-arms approach to the problem of mobility. This section focuses on the Soviet experience with such tactical organizations as the mobile obstacle detachment, movement support detachment, engineer reconnaissance patrol and the obstacle clearing detachment. The monograph then assesses the U.S. Army's mobility operations. An historical and doctrinal investigation reveals several trends which characterize our approach. We have generally relied upon the engineers to perform critical mobility tasks (countermine, counterobstacle, gap crossing, etc.) and have always experienced a shortage of tactical bridging and adequate minefield breaching doctrine and equipment. An analysis of lessons learned at the NTC and current training guidance established in many U.S. divisions reveals other more critical problems.

By comparing the organizations and capabilities of the Soviets, who have a long-standing experience with a maneuver-based doctrine, with current U.S. attitudes and emerging doctrine, several recommendations evolve which can be acted upon now to enhance our ability to execute AirLand Battle doctrine with the forces in being. The need to emphasize tactical unity during all phases of offensive operations is critical to the development of standard practices such as combined arms counterobstacle teams. There is no question that we have failed to learn the lessons of our previous wars by neglecting tactical bridging and mine warfare doctrine and equipment. That is not, however, satisfactory reason for not doing the best with what we have to insure the viability of our doctrine in the next war.

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SECTION I: INTRODUCTION

> There are many more ways to mobility than the use of motors. Mobility means, and needs, much more than mere movement along a road or over ground.[1]
> (B.H. Liddell Hart)

> . . . but little account has been taken of the difference between mobility and speed. In this difference is to be found the key to the future. Battlefield mobility, which is more important than the ability to move fast, is still the talisman of military success. Battlefield mobility however, is merely the dynamic of an essential tactical unity.[2]
> (S.L.A. Marshall)

The purpose of this paper is to examine how U.S. Army engineers can meet the tactical mobility needs of our AirLand Battle doctrine. A great deal of coordinated work has been accomplished recently between the engineer, armor, and infantry proponents. Their efforts signal a significant step forward in the understanding of mobility needs in terms of equipment development as well as doctrinal procedures. The intent of this paper is to examine ways of executing our doctrine within the constraints of existing force structure in light of the Soviet experience with a maneuver-oriented doctrine.

This study is particularly important today for several reasons. First, AirLand Battle doctrine, unlike any doctrine the U.S. has had since World War II, is maneuver-oriented. In the face of such challenges as outdated engineer equipment and doctrine to support offensive operations, tactical mobility has become a significant issue. Secondly, budget constraints will more than likely delay the acquisition of many engineer equipment items such as the Counter-obstacle Vehicle (COV), TEXS, Volcano, and others. Even if resources become available, it will take several years to acquire the equipment and develop viable doctrine for its employment. The implication is clear; we must pursue methods which will enable us to achieve tactical mobility with the forces presently at our disposal.

The first undertaking of this study will be to reemphasize the meaning of mobility and eliminate any uncertainties implied by the opening quotations. A common understanding of mobility, its theoretical basis and its relationship to AirLand Battle doctrine is fundamental to the subsequent assessment of our ability to execute that doctrine. Mobility is the goal which all maneuver-oriented forces seek to achieve. As such, it is an effect or result of all the elements of mobility. The most significant organizational element of mobility is tactical unity. This paper focuses on integrating engineers into tactical formations.

The paper will then assess the threat by examining Soviet mobility operations from a doctrinal and historical perspective. The focus of this section will be on Soviet engineer organizations, functions, and capabilities in support of tactical offensive maneuver. The Eastern Front, particularly during the latter part of World War II, provides a Soviet perspective. This analysis will render some insights into how a maneuver-oriented force achieves tactical mobility.

Having examined the status of Soviet combat engineers, this paper will then assess U.S. engineer organizations, functions, and capabilities in support of tactical offensive operations. It is particularly useful to examine the lessons learned during World War II, the last time the U.S. conducted ground maneuver warfare. Many of those lessons are independent of equipment capabilities and are only recently being digested. The Korean and Vietnam Wars offer few insights into maneuver warfare.

Finally, a comparison between U.S. and Soviet engineer organizations, functions, and capabilities will reveal some actions which we should take now to enhance the tactical unity (hence mobility) of U.S. ground forces. The example of the Soviet approach to achieving mobility on a maneuver-oriented battlefield merely serves to underscore lessons we learned in World War II and need to remember as we prepare for the AirLand Battlefield of tomorrow.

In order to limit the scope of this paper and to maintain a singular focus on tactical mobility, the following parameters (assumptions or constraints) are established:

1. AirLand Battle doctrine will be executed in the European Theater of operations.

2. The no-notice, mid-to-high intensity war portrayed by FM 100-5 necessarily dictates that we be prepared to fight with what we have. This also presupposes that current lags in fielding new equipment, doctrine, or force structure will continue to delay such events as the implementation of "E-force" (a proposed reorganization of the divisional enginer battalion) and the procurement of the many items of engineer equipment awaiting funding. It also suggests that we will not have time to mobilize our production lines in time to impact on the war.

3. Soviet historical analyses of the Eastern Front of World War II are their basis for force structure and doctrinal changes. Therefore, any capabilities exhibited during that war can provide reasonable approximations of norms where specific norms cannot be found.

4. The issue of mixed vehicle mobilities (wheeled with tracks or tracks with varying speed capabilities) will not be addressed. It has been shown that we have fought and can fight successfully with mixed mobilities.[3]

The U.S. Army must continue to make sound resource decisions and be prepared to translate our research and development efforts into much needed systems. But, systems alone will not insure victory. Today, victory can only be achieved if the Army is prepared to execute its doctrine with the forces in being. To support a maneuver-oriented doctrine, the Army must be able to sustain tactical mobility. The next section assesses the concept of tactical mobility and establishes tactical unity as a focus for the remainder of the paper.

SECTION II: TACTICAL MOBILITY

> Speed is the essence of war. Take advantage of the enemy's unpreparedness; travel by unexpected routes and strike him where he has taken no precautions.
>
> The general principles applicable to an invading force are that when you have penetrated deeply into hostile territory your army is united and the defender cannot overcome you.[4]
>
> (Sun Tzu)

A. BACKGROUND

The renewed offensive spirit of AirLand Battle doctrine necessitates a clear understanding of mobility. Having been mired in a defensive mindset for several years, mobility now pervades every tenet of U.S. doctrine in a sense which is much broader in scope than implied by Sun Tzu. Yet even today his words are misinterpreted in the narrower sense of speed or movement on the battlefield. This view is inadequate for current application. This section will define mobility, describe tactical unity, and contrast U.S. and Soviet thinking regarding mobility.

B. DEFINITIONS

The grander concepts of strategic and operational mobility which concern deployments or movements of forces to or within theaters of war or operations will not be addressed. Their importance notwithstanding, the focus of this study is on tactical mobility at division level since according to U.S. Army doctrine, divisions are designed to be largely self-sustaining and are the basic units of maneuver at the tactical level.[5]

Many attempts have been made at defining mobility. In addition to the quotes at the opening of the introduction, several others are cited in a U.S. Army Command and General Staff College study: mobility is -- ease of movement and speed; strictly mounted movement; speed, range, and maneuverability; a relative concept which captures the ability of one commander to move his forces more rapidly than another; a state of mind which is the ability to stand against fire and deliver it; and finally, to General Ridgeway, mobility was the ability to shift striking power.[6] The study presents several historical examples and concludes that despite the youthfulness of armored warfare, the value of mobility has been recognized since man first used a horse in battle. And even then, mobility meant much more than speed.

General Creighton Abrams articulated five factors in a study he completed as a War College student. Those factors as well as his discussion are relevant today.

> There is some confusion as to just what makes mobility in the ground elements of the Army. Some would say it was tanks, trucks, and self-propelled artillery. A popular means of comparing the relative mobility of field armies is to take the ratio of tank battalions to infantry battalions. There are many others; but mobility, if it is to be real and effective, is made up of a complex balance of factors. The essential factors of mobility are equipment, organization, communications, command structure, and logistical organization. ... They are based on practical and, to a degree, objective experience in an armored division during World War II, 2 1/2 years as Director of Tactics at the Armored School, 22 months commanding the organic tank battalion of the First Infantry Division, and 14 months commanding the Second Armored Cavalry Regiment.[7]

Considering all of the thoughts presented here, it is clear that mobiliy is not limited to the mere movement of forces. It must include improved methods and procedures in the conduct of operations. Mobility, then, is the swift and efficient articulation of the various elements of combat power in the application of the principles of war.[8]

C. TACTICAL UNITY

General Abrams cited organization as a necessary element of mobility. A study of mobility defines four separate facets of organization which comprise this element: tactical flexibility, command structure, tactical unity, and logistic support. The author goes on to describe tactical unity:

> Tactical unity, in one sense, implies the teamwork required for tactical success. For instance there must be infantry to accompany and fight with tanks, engineers to reduce obstacles, artillery to provide fire suport. In this sense alone integration of means has a great impact on the sustainment of mobility.[9]

For the purpose of this paper, tactical unity means much more than is implied by that statement. It means even more than today's terminology -- synchronization. Tactical unity must encompass the mindset or sense of unity of purpose necessary to synchronize and integrate combat, combat support, and combat service support elements.

D. U.S. VERSUS SOVIET VIEW

The mental aspect or mindset is also fundamental to understanding any comparison between U.S. and Soviet tactical mobility operations. Richard Simpkin explains the two schools of thought as diametrically opposed concepts which are coexisting on the same battlefield with the same ultimate end in view -- namely the destruction of the enemy force.

> The Anglo-American school is based on the literal interpretation on von Clauswitz' 'concept of destruction' and on firepower as the principal instrument of imposing the commander's will. The other, pioneered by Fuller and his colleagues, given shape by Liddell Hart, voiced by deGaulle and implemented by two generations of Germans and Russians, allows 'disruption' as an alternative to destruction and is based on the movement of masses and the dynamic forces thus created.[10]

In terms of mobility, the object is continuous movement on one hand, and seeking positional advantage on the other. The Soviet view is to strike deep and fast, destroying bypassed forces later, while we seek favorable positions from which to employ firepower to destroy the enemy. The point to keep in mind is, as Simpkin states, that dynamics produced by the theory of disruption are translated into fighting power purely at the tactical level.

U.S. doctrine is moving away from the traditional 'positional' theory toward the disruption theory. Evidence of that shift is implicit in the interdependent tenets of our doctrine. Those tenets guide the generation and application of combat power. The aspects of those tenets which illustrate this shift in the U.S. perception of tactical mobility are:[11]

> INITIATIVE: . . . requires a constant effort to force the enemy to conform to our operational purpose and tempo while retaining our freedom of action. ... In the attack, initiative implies never allowing the enemy to recover ... requires concentration, speed, audacity, and violence in execution; the seeking of soft spots; flexible shifting of the main effort; and prompt transition to the exploitation.
>
> AGILITY: . . . the ability of friendly forces to act faster than the enemy - is the first prerequisite for seizing and retaining the initiative.
>
> DEPTH: . . . extension of operations in space, time, and resources. ... obtains the necessary space to maneuver effectively; ... momentum in the attack.
>
> SYNCHRONIZATION: . . . in an attack, supporting fires are synchronized with maneuver . . .

Tactical mobility is also vital to ultimate operational success. The operational perspective of our doctrine amplifies this importance. While some would argue that tactical success is not a prerequisite for operational success, our doctrine clearly states that tactical gains can lead to operational successes. This is not merely a moot point. Its relevance to the mobility issue at hand lies in the Soviet view. A recent article by Lt Gen A.A. Sokolov stated that successful tactical breakthroughs are necessary if an offensive operation is to be translated into an operational success.[12] Tactical mobility, then, is essential to the successful execution of AirLand Battle offensive operations at the operational as well as the tactical level.

E. SUMMARY

If mobility is an effect, who is responsible for mobility? When we address that issue today we generally think of mobility as one of the basic functions of the engineers. But that is impossible if what has been stated so far is true -- namely that tactical mobility is an effect of tactical unity and the other organizational factors described. This is the starting point for answering the original question of how engineers can meet the mobility needs of today. The organizational aspects of mobility and the attendant role of the engineer provides the background necessary to fully understand mobility. The framework for the ensuing investigation will be to assess engineer organizations, functions, and capabilities of the Soviet Army in an attempt to gain insights into how they, as a maneuver-oriented force, intend to achieve tactical mobility.

SECTION III: SOVIET ENGINEER ORGANIZATION AND DOCTRINE

A. BACKGROUND

The historical and doctrinal employment of Soviet combat engineers illustrates the Soviets' comprehension of the importance of tactical mobility. Furthermore, their all-arms approach suggests that they appreciate that tactical mobility derives not from reliance on one arm (engineer in this case) to accomplish specific functions, but as a result of tactical unity. This section assesses Soviet engineer combat organizations, their functions, and their capabilities. This assessment will provide a basis for later comparison.

B. TACTICAL UNITY

Soviet offensive doctrine has but one aim -- to bring about the decisive and swift defeat of their opponents through offensive action. In NATO, that means a collapse of the alliance before nuclear arms can be employed or conventional arms have time to prepare defenses. To accomplish this aim, they have a fixed hierarchy of principles which guide their every decision. The first and most important principle is:

> Flexibility and a High Tempo of Combat Operations: High rates of advance are regarded by the High Command as an indicator of success. ... The overall psychological effect could be great enough to bring about the collapse of the coalition ...[13]

Inherent in this principle is the realization that sustained rates of advance depend on the effective cooperation, coordination, and integration of all arms and services. Only close mutual support will ensure success.[14]

The role of the engineer is critical, especially during offensive operations. But despite the long-standing importance attached to engineers, greater significance is attached to the effects of combined arms operations. The first few subordinate engineer principles illustrate this focus on the coordination of all arms toward the swift attainment of tactical objectives:

> Engineer activity (1) must correspond to the concept of the approaching battle, and fit well with the commanders' plans; (2) must be completed in good time; (3) must be concealed so that the enemy cannot divine the commanders' intentions; (4) must be purposeful, ie. contribute to the main assault in the attack, or main sector in the defense;[15]

Other branches are also held accountable for the execution of engineer tasks as illustrated by this quote: "Personnel of all arms of service are enlisted in engineer support. In this, motorized rifle and engineer subunits may allot 70-80% of personnel, artillery -- 60-70%, tank -- 50-60%, rocket -- 30-40%".[16] In terms of equipment development and procurement, Soviet engineers are second only to tank forces in average horsepower per man indicating a high degree of mechanization within the engineers.[17] Lately, there has even been a concerted effort to improve engineer equipment.[18] At a grander level, this sort of anti-branch parochialism is the first step toward achieving tactical unity.

The Soviets have placed significant emphasis on the accomplishment of engineer tasks by all arms despite a wealth of specialized engineer equipment and units. They have developed temporary tactical organizations which maximize the effectiveness of engineers. The effect of this unity of effort is the tactical mobility required to sustain offensive operations.

C. ORGANIZATION

There are four special purpose functional groupings of combined arms elements which Soviets employ to support offensive operations. These four groupings (tactical organizations) are:

Engineer reconnaissance Patrol (inzhenernyy razvedyvatel'nyy dozor--IRD): performs advance reconnaisance activities for higher-level engineer organizations in order that following units may properly prepare for tasks.

Movement Support Detachment (otryad obespecheniya dvizheniya--OOD): performs a wide variety of tasks in support of tactical unit movement, ensuring high rates of advance. It is equipped for overcoming obstacles to movement and expediently improving routes of advance.

Reconnaissance/Obstacle Clearing Detachment (otryad razvedki i razgrazhdeniya--ORR): operates in conjunction with the OOD. The ORR normally works ahead of the OOD as an initial reconnaissance/route preparation detachment.

Mobile Obstacle Detachment (podvizhnyy otryad zagrazhdeniya--POZ): a temporary task organization which optimizes minefield and explosive obstacle support, while minimizing possible benefit to opposing forces.[19]

These temporary organizations illustrate the major strengths of Soviet engineer utilization -- flexibility and specialization. Additionally, it should be emphasized that these are combined arms organizations which usually consist of security (maneuver) forces, CBR personnel, and usually anti-tank reserves. Figure 1 (page 41) illustrates the typical composition of each organization. The ability to form these organizations is best illustrated by the engineer force structure which is depicted at figure 2 (page 42). The specialization inherent at all levels enables regiment and higher echelons to form such organizations. Therein lies the flexibility which is the basis for their employment.

D. EARLY HISTORY

Before assessing the functions and capabilities of these organizations, it is essential to review their historical roots. In the early part of World War II, Red Army engineers faced several problems. Regulations for the installation of obstacles were being violated. There was a lack of technically trained and qualified leaders and troops. Field commanders were incapable of handling diverse combined arms formations and there was a very weak interaction between engineers and other military branches.[19] To correct these problems, The Supreme High Command Headquarters Order of 28 November 1941, shortly before the Moscow offensive, directed a reorganization of engineers. This reorganization established a chief of engineering services who doubled as a deputy commander at army and FRONT levels, ordered a 90 battalion engineer reserve, and established a need to organize engineers wisely as part of the combined arms team (POZs were ordered into existence in early 1943).[21]

As with most of the technical branches during the Red Army reorganization after the Finnish War, engineers were centralized into sapper brigades to permit the concentration of critical resources at Army and higher levels.[22] As the Red Army rebounded from early defeats, its leaders realized the importance of engineers. For example, this historical summary of the POZ illustrates the maturation of the Soviet engineer organizations:

> The bases of POZ tactics in the offense and defense were developed during the Battle of Kursk in 1943. As a rule, in the defense they were located in the depth of the combat formations of troops, in areas which permitted them to maneuver on the axes of greatest threat. In the course of combat the POZ moved forward on order and mined terrain in sectors of active enemy attack or breaches in the friendly tank and infantry forces. In the offense they were used in repulsing counterattacks and for covering open flanks and functions between units. Experience gained in the years of the Great Patriotic War convincingly testified to the advisability and necessity of creating POZ with the capability to move forward and establish minefield obstacles on threatened axes during the course of battle.[23]

The other task organizations developed in similar fashion. Specific lessons learned during the Eastern Front campaigns will be highlighted during the discussion of the capabilities of the organizations later in this section.

The lessons of that war were not overlooked. After the war, the number of men in the divisional engineer battalion increased from 170 to 300 reflecting the reintroduction of such functions as bridging into the division. The large non-divisional formations remained however as assault regiments. [24] Figure 2 (page 42) illustrates the specialization and size of the engineer force.

Another significant aspect of Soviet organization is its compatibility with tactical doctrine. Not only are all branches resourced to support the Soviet penchant for highly mobile concentration of forces, they are organized in a manner which best suits the attainment of high rates of advance as a unified force. A recent example of this is the Soviet experience in Afghanistan. The shrewd mine warfare tactics of the Afghanis have led some observers to postulate that: "It is highly likely that Soviet planners have revised their views on the optimum movement support (OOD) to combat force strength for theaters opposite NATO." [25] Soviet doctrine and organization continue to evolve in tandem in response to rigorous analyses of their experiences.

E. FUNCTIONS

In general, the missions of engineers are classified according to the nature of the combined arms battle. Figure 3 (page 43) illustrates the functional nature of this classification. The key functions which will be investigated in this paper are:

Function	Unit
Reconnaissance	- IRD, ORR
Counterobstacle	- OOD
Gap Crossing	- OOD
Countermobility (offense)	- POZ

To understand the impact of these organizations on attaining tactical mobility better, their capabilities will be assessed in a doctrinal and historical context within the next subsection.

F. CAPABILITIES

General Employment

In the offense, Soviet engineer detachments are employed to sustain the continuous movement of the attack. The organic regimental engineer company can field one platoon sized OOD or ORR. The divisional battalion can field two to three company sized OODs. Additionally, IRDs and POZs are formed and, with the OODs and IRDs, integrated into the plan of attack. The normal employment of these detachments in the attack would find division OODs and IRDs employed on the division main axes, regimental ORRs in front on main axes, and POZs teamed with the antitank reserve and centrally located between the first and second echelons to counter threats on the flanks of the formation.[26] Figure 4 (page 44) illustrates the deployment of these detachments in a combined arms attack.

Reconnaissance

Soviet offensive operations rely heavily on knowledge of the enemy. This is especially true of engineer operations. Soviet engineer doctrine specifies that large scale maps, geographical descriptions in handbooks of the area, aerial photography, and direct examination are the main methods of reconnaissance. Of these, aerial photography is deemed the most important.[27] The focus of engineer reconnaissance is to portray the condition of the terrain accurately in order to find weaknesses in the defense and optimize the employment of the attacking force.

Reconnaissance detachments operate well forward and are integrated into the combined arms formation. Squad level IRDs will normally be sent out on every route as part of combat reconnaissance patrols and groups and included in advanced detachments such as airborne assaults.[28] Additionally, engineer observation posts (INP) are provided by subunits in direct contact with the enemy. Normally, one observation post covers a one to two kilometer sector or a battalion axis of advance, but a breakthrough sector may require twice as many INPs. The success of employing these assets well forward is best illustrated by the Vistula-Oder Operation in 1945. Continuous observation by four INPs per kilometer of front and over 118 reconnaissance raids behind enemy lines enabled the Soviets to compile a complete picture of enemy defenses. That in turn helped determine the best employment of engineers with maneuver forces.[29]

Reconnaissance for locations of obstacles on the flanks during an attack is the responsibility of the POZ. The other major reconnaissance thrust of current Soviet doctrine is continual observation by special recon men in each platoon for the enemy employment of scatterable mines.[30]

Counterobstacle

Soviet attacks from the march usually consist of a breakthrough (first echelon) force and an exploitation (second echelon) force. The doctrinal employment of the OOD (see figure 4) is so defined to reinforce the most critical part of the attack -- the breakthrough. Counterobstacle operations (countermine and obstacle) are designed to ensure the breakthrough.

The primary concern of Soviet writers seems to be countermine operations. Furthermore, the key to a successful breakthrough is attacking on a broad front and ensuring adequate passages through minefields for the sustainment of the advance (continuous movement). While the situation will dictate the exact number of passages, the doctrinal norm is one to two lanes per maneuver company. During the latter part of World War II, they were able to accomplish that norm. On the average, 36 obstacle clearing groups (25 men) were formed from each engineer battalion to clear 36 lanes for 18 companies in four to six hours, clearing 5-6000 mines.[31]

It appears from examination of several campaigns on the Eastern Front that mass, even in terms of engineer forces, enabled the attainment of these impressive figures. Soviet writings even pay special attention to their growth during the war. Engineer forces grew from two engineer companies per kilometer of front in 1941 to 22 companies in 1944.[32] This massing of forces was made possible by the close planning of operations at the Supreme High Command level and a vast engineer reserve.

Cooperation among branches during the planning phase was also key at all lower levels. One study summed it up this way:

> Of great importance in organizing negotiation of minefields is joint work by commanders and staffs of combined-arms units, operational formations, and engineer commanders of all levels. The experience of the Great Patriotic War indicates that commanding generals (combined-arms commanders) were personally involved in choosing methods, ... as well as organization of coordinated action.[33]

Figure 5 (page 45) depicts the details of a plan during a recent Soviet exercise. Results of that same exercise however point out one weakness in Soviet countermine capability -- dealing with remotely delivered mines.[34] Despite their ability to organize and coordinate masses of engineer units, Soviet counterobstacle capabilities are far from unstoppable.

Gap Crossing

Soviet doctrine specifies one lane per first echelon battalion when crossing narrow gaps. The OOD is employed for this task as well as each tank battalion which has a BTU multipurpose bulldozer system. Soviet engineer bridge assets appear to be adequate to meet that requirement. In the event they are not, they will resort to creating passages by dozing the banks (5-10 minutes) or by explosively knocking the banks down (10-30 minutes).[35] Additionally, Soviet writings indicate that other methods of improvising such as preconstructed wooden bridges, fascines, or other expedients will be used.

Countermobility

The main feature of the time-tested POZ lay "in the placement of mines, not ahead of time on assumed lines, but right in front of attacking enemy tanks and infantry. In this way surprise was achieved and the success of the engineers' actions predetermined. [36] The POZ normally supports the antitank reserve. Every division is required to retain an antitank reserve which may consist of the 51 tanks of the independent tank battalion or the antitank guns of the division artillery. Employed in this manner, the POZ usually comes under the temporary command of the antitank commander.[37]

A company-sized POZ can emplace a maximum of three minefields and three point obstacles.[38] This accounts for the capabilities of the equipment and the fact that the intent is for the antitank reserve to cover the obstacles by fire. Limiting the available effort of the POZ has the benefit of limiting the mine resupply efforts as well as focusing the POZ in a smaller geographical area. However, in order for the division to enjoy responsive POZ support of its flanks during an offensive operation, several POZs will be required from army or FRONT assets.

Logistics can be a limiting factor. During the Battle of Kursk, the 13th Army had five company-size POZs which each had 8400 antitank mines and 4100 antipersonnel mines transported on 23 trucks.[39] Those trucks are not readily available today. One Soviet article cited a young officer for failing to coordinate mine resupply during an exercise. The article also cited other problems such as failure of the POZ commander to arrive at his location on time.[40] So, despite the flexibility and combined nature of the POZ, it has weaknesses. The point here is that despite the historical and doctrinal setting of Soviet mobility operations, extensive training is required.

G. SUMMARY

Soviet engineer task organizations were formed in response to failures during World War II -- specifically, the failure of combined arms commanders to integrate engineers into tactical plans. Today, the flexible employment of engineer assets is routine. Additionally, many "engineer" functions are routinely executed by maneuver elements. The intent of such a doctrine is to avoid looking for the engineer when obstacles are encountered.

The key features of the POZ, OOD, IRD, and ORR are: they are formed from specialized units which are organic down to regiment; their functions are understood by combined arms commanders and employed in a standard manner to facilitate training; they are heavily reliant on intelligence; they can be formed from army and FRONT assets to augment their numbers in the division; and they are positioned throughout the division where they can best support continuous movement while killing enemy systems in the process.

The next section will be a similar assessment of U.S. capabilities. The specific time estimates for various operations are included at Figure 14 (page 57) for later consideration.

SECTION IV: U.S. ENGINEER ORGANIZATION AND DOCTRINE

A. BACKGROUND

The U.S. preference for attacking by fire from a position of advantage has already been explained. Our doctrine has changed, however, adopting an offensive flair which includes attacking deep into the enemy's rear. These attacks can involve heavy ground forces as described by one article:

> Maneuver forces, fighting in depth, offer some considerable advantages over deep attack by fire alone. The direct-fire weapons of maneuver units and the conventional, nuclear, and chemical munitions they carry will create a stronger, wider, and more lasting effect on the enemy than conventional, long-range fire support systems.[41]

Whether supporting such deep operations or other more limited offensive operations, a considerable degree of tactical mobility is required. The ability of engineer forces to enhance that mobility is largely dependent upon how they are organized and integrated into the combined arms team. This section assesses U.S. Army engineer organization, functions, and capabilities.

B. TACTICAL UNITY

AirLand Battle doctrine emphasizes combined arms and joint cooperation as doctrinal imperatives. Arms and services combine their capabilities to complement or reinforce each other to create favorable conditions for U.S. forces and dilemmas for the enemy.[42] This implies a combining of distinct units with different capabilities into a unified force which enjoys the synergistic effects of the combination. Where engineers are concerned, this naturally leads to the impression that mobility functions are the responsibility of the engineers. If that is true, it will be more difficult to obtain tactical mobility because there will be a lack of tactical unity. This section assesses organization for mobility in this light.

C. MOBILITY HISTORY

The Army of the 1980's, like the Army of the 1930's, is struggling with the problems of changing from an attrition-based doctrine to a maneuver-based doctrine.[43] A brief look at that period will lend some insight into mistakes and problems the U.S. has already experienced and should avoid in the future.

There were three major developments that increased our mobility requirements in the early 1940's: the German Blitzkrieg; the experiences of the 1940 maneuvers; and the increased use of obstacles in Europe.[44]

In addition to equipment research, different organizations were tried in an attempt to find ways to meet the new mobility demands. The first hurdle was increasing the number of engineers in the division. The divisional engineer battalion had been reduced from 816 to 420 men by 1939 as a result of the 1936 triangular division reorganization. Mobility was considered less important than in the old square division. Beyond mere numbers, however, the same studies and maneuvers which led to strength changes produced some interesting conclusions. Some of these conclusions were: 1) infantry, as well as engineer troops should receive demolitions training; 2) the infantry division organization was not suited for breaching operations; and 3) the assault of a fortified zone should be conducted in four phases by a combined arms team consisting of armor, infantry, engineers, and artillery.[45]

The impact of these early analyses of Russian and German experiences led to doctrinal improvements in 1943. Of particular note were these conclusions: detailed reconnaissance of obstacles prior to an attack was essential; engineers must accompany lead elements; large-scale use of mines by Germans required that everyone be able to breach minefields (as a result, training courses were set up for all officers); and new methods of manual, explosive, and mechanical breaching were required.[46] By D-Day 1944, mobility equipment added to the inventory included bangalore torpedoes, mine detectors, mine rollers and snakes, armored bulldozers, and tank dozers. Many other items were yet to be fielded. Breaching doctrine was also lacking in such areas as techniques and possible alternatives such as bypassing.[47]

American experience during World War II also revealed mobility lessons. Much of the present doctrine reflects these lessons.[48] In terms of numbers of men required to perform missions throughout the depth of the battlefield, engineer forces increased from 7.5% to 8.3% of the Army from 1943 to 1945, or 25% of all technical services.[49] This reflects a dilemma which remains with us today -- the allocation of engineer forces to forward and rear missions. Both requirements cannot be fully satisfied with available engineer forces. Many other lessons were learned during World War II. LOC construction and maintenance took top priority in order to keep logistics moving forward. A shortage of tactical bridging and massive minefields stalled American momentum and limited flexibility in the forward combat zones. Despite the equipment build-up that resulted from studying the Russian experiences, dozers were still in short supply thus limiting U.S. ability to construct roads. Offensive tactics included advancing on multiple routes which resulted in quickly outstripping tactical bridging assets as well as engineers to breach minefields. To compensate, division commanders trained their armor and infantry soldiers in mine clearing to sustain the forward momentum. This action was especially important to the success of Operation Cobra and the breakout from Normandy. Improvisation played a key role also with such battlefield inventions as the "rhinoceros" tank attachment which was used to knock down the hedgerows in the bocage'. Throughout the remainder of the war however, formal countermine and counterobstacle capabilities were never improved. The answer was either more engineers or more training for the maneuver forces.[50]

Experiences in Korea and Vietnam were similar in that mine warfare and a shortage of tactical bridging posed the most difficult problems.[51] In Korea, only the Marines employed combined arms techniques effectively to reduce the barricades in Seoul.[52] Vietnam saw the emergence of special units which performed particular functions, such as the Rome plow battalions which cleared the jungle from around LOCs and base camps.[53] The lack of ground mobile warfare in these two wars limits the availability of mobility lessons learned.

The historical trends in U.S. mobility history are rather distinct. LOC support has taken top priority to keep supplies moving to forward divisions. The increased lethality and dispersion of the battlefield requires that engineers move with and are as survivable as maneuver units. Tactical bridging and countermine capabilities have been severely lacking. The only solutions to those problems has been either more engineers - or maneuver forces must do it themselves. In most cases, organizing engineer forces to support the wide range of battlefield functions has been done in an ad hoc manner based on the estimate of the situation and availability of a scarce resource -- engineers.

D. ORGANIZATION

Divisional engineers are organized and equipped as shown at Figure 6 (page 46). With the exception of the mobility/countermobility platoon which is a consolidation of equipment such as CEV's, engineer forces are not functionally organized. Platoons are expected to be able to execute the entire range of engineer support. Normal distribution of engineer assets is one company per maneuver brigade. Divisions can also expect to be augmented with up to two additional corps engineer battalions. Those battalions are normally employed as far forward as their limited survivability and maneuverbility will permit. The typical organization and assets of a corps combat engineer battalion are depicted in Figure 7 (page 47).

A current engineer initiative known as "E-Force" seeks to reconfigure the engineers into permanent combined arms entities and reduce the last minute task organizing inherent in our present force structure. The focal point of that concept however is on equipment (which does not currently exist) intensive engineer units which would still be lacking adequate minefield breaching capabilities.[54]

Doctrinal organization for breaching operations consists of three distinct elements:

> SUPPORT FORCE: consists of combat and combat support forces and becomes the base unit of support by moving to an overwatch position when an obstacle is contacted. It consists of direct fire, indirect fire, electronic warfare, smoke, and other such support. The assault or breaching force commander usually controls the support force to ensure close coordination.
>
> ASSAULT FORCE: quickly suppresses enemy fires in the breach area, cross the obstacle, and destroy the enemy on the far side. The assault force is built around infantry and armor units while engineers assist the movement of the assault force through the obstacle.
>
> BREACHING FORCE: creates and marks lanes in the minefield or obstacle to allow passage of the assault force. Breaching forces are composed of engineers, armor, and infantry.[55]

This concept of organization, while not explicitly employed in World War II, is similar in concept to the four phase assault of a fortified zone mentioned earlier. In addition to formalizing these procedures in engineer proponent manuals, breaching tasks are now an integral part of maneuver force tasks. For example, the draft Mission Training Plan for Mechanized Infantry platoons (Bradley) includes specific obstacle breaching tasks.

Despite this formal doctrine, there is a wide disparity in application throughout the Army. Figure 8 (page 48) is a summary of responses to a mobility survey of divisional units coupled with a review of division Mission Essential Task Lists for most of the divisions in the Army. The important conclusions which can be drawn from that information are:

1. Few units have SOP's pertaining to mobility operations.
2. Three of the four USAREUR divisions do not address mobility operations - they remain focused on defense.
3. Units with a mobility focus (SOP, METL) rely on combined arms organizations (though varying) for mobility operations.

In addition to the foregoing assessment, Figure 9 (page 52) summarizes the major mobility lessons learned at the National Training Center during the last year. My personal observation of a task force encountering an obstacle during a movement to contact at the National Training Center recently confirms many of the same problems. From an organizational viewpoint, the major lessons are:

1. There was a lack of engineers with scouts to conduct reconnaissance.
2. There was a lack of integrated planning (engineer with maneuver).
3. Engineers were used as breach teams without maneuver support.
4. Engineers placed too far forward took heavy losses to personnel and key equipment assets (CEVs, AVLBs).
5. The main body of the tactical formation was unable to find the breach.

Despite these problems, the fact that our doctrine has a renewed combined arms focus is causing them to surface and be reconciled within divisions. The remainder of this section assesses the functions and capabilities of support, assault, and breaching forces if doctrinally employed.

E. FUNCTIONS

U.S. doctrine defines five major mobility tasks: counterobstacle, gap crossing, countermine, combat roads and trails, and forward aviation combat engineering. The first three will be assessed here to maintain continuity for subsequent comparison with Soviet capabilities. Countermobility will also be addressed since this is a key function during the offense.

F. CAPABILITIES

General Employment

U.S. engineers are employed in the offense to sustain the momentum of the advance. Current and emerging doctrine emphasizes that engineers be integrated into the commander's scheme of maneuver. Figure 10 (page 53) illustrates the essential integration of combat and combat support elements for a task force movement to contact in single columns. The habitually associated divisional engineer platoon (mechanized) is located near the front in order to provide responsive support. In terms of capabilities, responsiveness is fundamental to tactical success.

Counterobstacle

One more historical reference is essential here to illustrate the level of responsive counterobstacle support not desired in future wars. The 1st Battalion, 110th Infantry Regiment had the mission to capture Hill 553 on 15 September 1944 on the Siegfried Line. Five rows of dragon's teeth and a roadblock prevented tanks from providing crucial support. Almost twelve hours later the engineers arrived. An hour and a half later, the charges were set. Activating their charges, the engineers jumped to their feet and "ran like hell to the rear." Acting on queue, the tanks fired pointblank on the pill-boxes while the infantry went forward on the run. Forty-five minutes later, Hill 553 was secure, yielding 17 pillboxes and 58 prisoners. Three bloody days of fighting had at last ended.[56]

Emerging doctrine seeks to eliminate the frequent lack of tactical unity where "engineer" functions are concerned. Figure 11 (page 54) illustrates a typical organization for breaching operations. The divisional engineer battalion can field one breaching force per battalion task force unless augmented by non-divisional engineer assets. The problem with augmentation is that non-divisional engineers are not mechanized and are therefore not as survivable nor as mobile as the maneuver forces they support. As a result, existing divisional engineers must be wisely employed. To be responsive, that means locating the breach force as far forward as possible. To avoid perishing during breaching operations, engineer activities must be supported by fire (support force). As shown by Figure 10, the generally accepted minimum size of the breaching team is a company team.[57]

The specific breaching capabilities for various obstacles and minefields is illustrated at Figure 14 (page 57).

Gap Crossing

The divisional capability to cross short wet or dry gaps is very limited. Each division has 16 armored vehicle launched bridges in the organic engineer battalion (4 per engineer company). Doctrinally, AVLBs are employed with the breach force, thus treating a gap as an obstacle. If employed in that manner, each brigade then has only two breaching teams with AVLBs. One division prefers to establish smaller breach forces and provide each with only one AVLB, thus providing the brigade with four mobility teams with AVLBs. Regardless, the division has very little organic assault gap crossing capability.

Additional assets which may be available include the medium girder and panel bridge companies. Those companies are normally allocated one per corps. If a division was fortunate to get one platoon from each company, it would have an additional capability to construct 2 bridges, an 80 foot panel bridge and a 100 foot medium girder bridge. It should be noted that those bridge units do not have the personnel to erect the bridges; line engineer platoons are required for those tasks. Doctrinally, these gap crossing assets are used to replace AVLBs which are removed and shuffled forward for reuse. Additionally, these bridging assets are not routinely employed as part of a movement support task organization.

Countermine

Countermine operations receive special treatment in U.S. doctrine due to the expected prolific use of mines by potential enemies. U.S. capabilities continue to be limited, however, reflecting many of the problems revealed during World War II. The same task organization for breaching is used for countermine as for counterobstacle operations. Limited breaching assets hinder flexibility in employment methods and task organization options.

Explosive methods such as bangalore torpedos, M173 line charges, and M157 demolition kits are class V items which are no longer manufactured and are in short supply. The introduction of MICLIC (mine clearing line charge) will not completely satisfy countermine requirements.[58]

Mechanical methods such as mine rollers and plows are in short supply and have not yet been fitted to the M1 tank. Doctrinally, it is not the responsibility of maneuver forces to breach minefields. For that reason, little has been done to develop adequate mine breaching equipment.

Recon/Countermobility

These two areas receive only light treatment where offensive operations are concerned. FASCAM is often seen as a stop-gap measure if the flanks of an attacking force are threatened. Reconnaissance is deemed important, yet outside of the scout elements of the maneuver force, engineer reconnaissance elements are provided by line platoons. The engineer battalion has inadequate reconnaissance assets to support division offensive operations.

G. SUMMARY

U.S. Army engineer support for modern mobile offensive operations began during the early years of World War II. The Russian experiences on the Eastern Front provided significant insights into the requirements of maneuver warfare. But despite American efforts to develop and field new items of mobility equipment and train all arms to conduct breaching operations, the U.S. entered the war unprepared to meet the demands of mobile warfare. Improvising, more engineers, or more training for combat arms soldiers were the typical responses to the shortcomings in tactical bridging and countermine operations.

The issue is more than equipment or TOE organization of engineer units. The real issue is tactical unity. This is one lesson which was learned during World War II and perhaps forgotten. Despite the fact that emerging doctrine is characterized by a combined arms approach, in practice obstacle breaching operations have a long way to go. Based on current divisional thinking and the experience of the NTC, the mindset seems to be that obstacles are the sole responsibility of the engineer.

The next section analyzes and evaluates U.S. and Soviet engineer organization and capabilities. That analysis reveals a few steps the U.S. can take to ensure tactical mobility within the limits of existing engineer forces.

SECTION V: ANALYSIS AND EVALUATION

A. BACKGROUND

At first glance it may appear that mine rollers and additional tactical bridging is all that we need to solve our mobility problems. However, if we accept that tactical mobility is an effect of tactical unity, as discussed in this study, then clearly there's a lot more to the issue.

This analysis will compare Soviet and U.S. engineer organizations and capabilities by answering the following questions: How well have historical lessons been learned? Is mobility solely an engineer function? How flexible are the organizations? What is the degree of standardization and training? Are the capabilities a function of equipment or organization for combat?

B. ORGANIZATION

Historical Perspective

The Soviets have conducted detailed and continuous analyses of their experiences in World War II. The results of those analyses led directly to changes in organization where weaknesses were identified, such as the increase in the divisional engineer battalion after the war. At the same time, successful organizations such as the POZ and OOD, which were conceived and heavily utilized during the war, remain today. Likewise, heavy reserves of engineers at army and front level remain today. Additionally, Soviet force development and equipment procurement have developed in stride with doctrine. Engineer doctrine is very specific and addresses the perceived threat posed by NATO in the case of Europe. As discussed earlier, their doctrine and organization continues to respond to new challenges faced in Afghanistan.

The U.S., on the other hand, has not responded to history. After the war we identified two major weaknesses -- a shortage of tactical bridging and an inadequate minefield breaching capability (mine roller, etc.). Those weaknesses continue to haunt us today. Organizationally, we tried several methods, but no standard approach such as that articulated by FC 90-13-1 was ever adopted. The lack of a combined arms focus on the mobility issue also continues to haunt us. During past wars as today at the NTC, the familiar cry 'where's the engineer' echoes while maneuver forces sit stymied by obstacles. Our training still lacks the combined arms mindset required to attain mobility on the battlefield. During World War II, we relied on early mistakes to guide training which would correct deficiencies. Today, emerging doctrine appears to be more proactive. Doctrine, however, is meaningless unless it is trained in peacetime and standardized. We have not been as responsive to the lessons of our past as the Soviets have.

Responsibility for Mobility

Soviet doctrine states that breaching obstacles is a maneuver function. Lacking rollers and plows, we continue to rely on the engineer. That wouldn't be so bad if in practice we adopted the same combined arms approach as the Soviets, guaranteeing the survivability of the engineers. It is interesting to note that even though Soviet engineers have enjoyed a substantial gain in equipment over the years, the responsibility for breaching obstacles in stride is still a maneuver commander's job while heading a combined arms team. The OICs of the POZs and OODs are the maneuver commanders, not the engineers. That is particular evident in Soviet writings about their wartime experiences and current training exercise. Detailed planning sessions are conducted despite standardized combined arms formations such as the POZ. We often fail to integrate engineers into the planning phase properly and lack standardization As evidenced by the survey results (Figure 8, page 48) and the NTC after-action reports (Figure 9, page 52). We are particularly negligent in emphasizing the role of engineers in conducting reconnaissance. Most battalion S2 sections have recon sections, but they are not routinely integrated into maneuver operations. The wide range of engineer responsibilities often requires these sections to examine areas pertaining to subsequent operations. In the offensive, they would be better employed with divisional recon elements.

Only recently have we begun to address the real crux of tactical mobility-tactical unity. The M9 Armored Combat Earthmover (ACE) is the first in a family of armored vehicles required to achieve this unity. The real point of optimism, however, is the fact that branch parochialism is giving way to smart force design and material acquisition. We still have a long way to go to equal the Soviet mindset. Combined arms operations require more than just the right mix of equipment - they require a spirit of unity of effort, even in force design.

Flexibility of Organizations

Soviet engineer organizations have greater flexibility in task organizing for specific operations as a result of their specialization, functional organization, and equipment intensive orientation. Figure 12 (page 55) illustrates a comparison of U.S. and Soviet breaching capabilities. Note that the percentage of engineer personnel in a division is nearly identical while Soviet engineers have a much greater quantity of equipment. U.S. engineer units are not specialized or functionally organized and hence are less flexible.

Of even greater significance is the ability of each nation's non-divisional engineers to contribute to the divisional fight forward. Figure 13 (page 56) illustrates the comparison of Soviet and U.S. non-divisional engineer assets. Clearly, the Soviets have structured their army and frontal engineer battalions much like their divisional battalions. The U.S., on the other hand, has not. As a result, the Soviets can form standard POZs or whatever they desire using non-divisional assets, then quickly integrate them into the combined arms formation. The combined arms commander then knows what he is getting in terms of equipment and more importantly, in terms of capability. The task organization, method of employment, and estimate process are now streamlined.

A quick look at tactical bridging illustrates the problems that arise from our inability to accomplish the same degree of flexibility. Corps engineer battalions have no AVLBs. Therefore, corps units cannot be used for forward bridging missions. Given the lack of tactical bridging, other means must be employed. Corps engineer units do have missions in the division sector that must be planned and trained for, like installing medium girder or panel bridges to sustain the forward momentum of the division. These missions are not, however, normally conducted well forward.

Another critical issue concerning the flexibility of organizing for the offense is the ability to shift support rapidly. Soviet centralization of substantial engineer forces, which are similarly organized and equipped as divisional engineer battalions, enables them to shift support where it is most required. They are even willing to denude a division of its organic engineer assets if necessary. U.S. doctrine specifies that divisions will receive at least two additional corps engineer battalions during combat. The caviat is that corps engineer battalions are too soft skinned to be effective in the division area. Furthermore, corps engineers are not routinely integrated into divisional training. A more critical issue is the lack of standard organizations as well as the organizational flexibility to quickly integrate corps engineers into divisional plans. Command and control are just two of the issues which cause delays when corps units are provided to the division. The issue of being soft skinned may also be overrated. Figure 13 shows that Soviet divisional engineers rely heavily on trucks to transport their troops. Typically, U.S. organic engineers have three times as many personnel carriers. Supported by training and standard mission drills, the U.S. can be prepared to support rapid shifts in the main effort by emphasizing the critical role of centrally controlled corps engineer units. To bridge that gap, a more proactive role for the corps engineer brigade in integrating corps units into divisional training within the corps is suggested.

Standardization of Employment

Soviet doctrine and organization is much more unified than ours. As a result, the employment of engineers is relatively standard. Based on the survey responses (Figure 8), the role of the engineer is not standardized in every division. For example, in one division, the engineer platoon was the breaching force for one brigade while the engineer platoon in another brigade widened the breach made by maneuver forces. This lack of standardization and drills will not permit U.S. forces to breach obstacles, especially minefields, in stride. As already stated, the problem of integrating corps units into the division plan is further compounded by this lack of standardization. Another indicator of this problem is the lack of breaching SOPs. Based on the survey results, few divisions have such documents.

The picture here is not all bleak. Recently, FC 90-13-1, Combined Arms Counterobstacle Operations: The In-Stride Breach, was published (June 1987).

This document provides drills and techniques for use at the task force level for breaching obstacles. The challenge remaining is to make the procedures outlined in that document standard throughout the army. Furthermore, the problem must be viewed and trained as a combined arms mission to make these methods effective. The U.S. may lack flexibility because of differences in equipment or organization, but these shortcomings can be compensated for by standardizing training and organization for combat. The aim which must unify this effort is the desire to mass combat power at the decisive point and win.

C. CAPABILITIES

It is useful to examine the source of capabilities within each of the functions discussed in sections III and IV. Are these capabilities a product of merely massing engineer equipment or are they a product of well-designed combined arms efforts? Figure 14 (page 57) depicts some of the key tasks and their associated execution times. In general, individual capabilites are virtually the same. The difference in demonstrated ability then must lie in the synergism of combining engineer and maneuver elements to execute the engineer art.

Reconnaissance

There's no question that reconnaissance is vital to the success of any mission. It is especially important to offensive operations. Early identification and detection of obstacles is a must. Soviet doctrine, like U.S. doctrine, stresses this importance. The Soviets, however, have gone one step further by formally organizing combined arms reconnaissance elements. The doctrinal employment of those elements requires that they be combined arms organizations. The U.S. does not have the same emphasis. Soviet engineer battalions have specially trained reconnaissance elements. The NTC experience

(Figure 9) clearly shows a lack of integration of engineers into reconnaissance efforts (with scouts).

It is not necessary to be functionally organized to achieve the same results. It is a simple matter to standardize the combined arms training of reconnaissance elements for such missions. The key point is to avoid ad hoc arrangements which, in the heat of battle, leave room for parts of the recon force (such as the engineer) to be left behind, unnoticed and probably not missed until it is too late.

Counterobstacle/Countermine

Figure 14 illustrates the similarities in breaching capabilities of individual systems. Mass or numbers of systems may enhance those capabilities. But the real enhancer is the mindset. Soviet maneuver forces are responsible for breaching obstacles. Furthermore, the focus of their offensive operations is to fight between moves -- in other words, a maneuver-oriented mindset. As a result, all arms are integrated to achieve the penetration and exploitation into the enemy rear. The U.S. views it quite differently. Obstacles become missions in themselves. The result is a mindset of moving between fights. We seek positional advantage to deliver fires, so maneuver is not the object of our efforts. The result is a failure to combine the efforts of all arms in an efficient manner. This view of obstacles indicates a lack of a maneuver-oriented mindset.

Gap Crossing

The Soviets have a clear advantage. Figure 13 depicts the tremendous redundancy of tactical bridging the Soviets enjoy. The solutions are obvious. The U.S. must either purchase more equipment, rely on expedient methods of which there are several, or secure gap crossing sites before the war begins. Targeting their assets as a priority task has limited utility since they also have a tremendous dozer blade capability which can be used to destroy banks and facilitate crossings. The only short term solution that appears feasible in the context of this study is to utilize expedients such as fascines. The benefit of such a move would be to serve as a reminder to maneuver commanders of their role in achieving tactical mobility on the battlefield. The fielding of the M9 ACE will also provide some gap crossing capability when employed in a bank breaching role. Figure 13 points out the advantage in dozer blades that U.S. units will enjoy when it is fielded.

Countermobility

The mobile obstacle detachment is a time-tested and war-proven concept. Soviet writings attest to the performance of many of these organizations. The most important point is the manner in which they are employed. First, POZs are employed on the offense as well as the defense. They emplace obstacles immediately in front of a maneuvering enemy, thus optimizing their capability (by limiting logistics burden, etc.). Secondly, they depict the Soviet mindset of a total view of mobility. Not only are POZs combined arms formations, they are seen as a critical element in providing flank security, an anti-maneuver capability, and a force destruction capability. The objective is to stop us and force us to fight so they don't have to deploy -- ensuring the attainment of their goal - continuous movement toward their objective. U.S. forces address flank security, but recent exercises seem to portray a dependence on FASCAM. Obstacles which are not covered by direct or observed indirect fire are useless. Hence, FASCAM is questionable for flank security. This reliance indicates a lack of appreciation by U.S. forces for the importance of the contributions of all actions on the battlefield to achieving mobility.

SECTION VI: CONCLUSIONS

Soviet engineer task organizations represent the tactical unity required to execute a maneuver-oriented offensive doctrine. Those organizations are deeply rooted in Soviet doctrine, practice, and historical analyses. The U.S. cannot make the same claim. Having only recently returned to a maneuver-oriented doctrine, the long-ignored lessons of World War II are just beginning to acquire meaning. The major lesson for the U.S. is that tactical mobility requires more than just greater numbers of engineers, more obstacle breaching training for maneuver forces, or greater amounts of engineer equipment. It takes a strong sense of tactical unity.

Mobility is not a function which can be accomplished by engineers alone. In the past, U.S. engineers were relied upon to perform this function. Current Soviet doctrine emphasizes the roles and responsibilities of all arms in achieving tactical mobility. The pace and dispersion of the modern battlefield requires a total effort to sustain freedom of maneuver. The recently published FC 90-13-1 is a superb starting point for the development of divisional SOPs and drills. The mere fact that that document was a joint effort of the armor, infantry, and engineer proponents signifies a realization that mobility is not solely the engineers' job.

Soviet engineer TOE organizations are more flexible as a result of their specialization, functional organization, and equipment intensity. "E-Force", which adopts an equipment-intensive approach and the myriad of engineer equipment awaiting procurement will add greater flexibility to the engineer force structure. Time and resources however make it necessary to seek more efficient ways of task organizing limited engineer resources today.

The divisional engineer battalion is inadequate for the level of effort required during offensive operations. Standardized task organizations for corps engineer battalions and integration of them into divisional training exercises is essential. In the absence of peacetime integration into training, adopting and training with standard organizations in peacetime will reduce command and control and task organization problems while facilitating integration of corps engineer units. The risk inherent in employing soft-skinned vehicles in the division forward area will have to be accepted.

The functions and capabilities of U.S. and Soviet engineers are very similar. The major U.S. shortcomings are integration of combat support arms into reconnaissance efforts, a shortage of tactical bridging and assault gap cross-doctrine, and a lack of adequate countermine equipment and doctrine. The problem extends beyond a mere shortage of equipment however. The capabilities of engineer forces are enhanced when employed as part of a combined arms team.

Just as an army's capability to perform offensive missions stems from an offensive mindset, our capability to generate a mobility differential on the AirLand Battlefield will stem from our tactical unity. The manner in which we organize our scarce engineer resources is just one part, albeit a major one, of our efforts to do the best with what we've got.

To conclude this study, several recommendations are offered in the next section as a basis for further study or as concrete ideas that may be implemented now to enhance our readiness to fight and win offensively as a tactically unified combined arms force.

SECTION VII: RECOMMENDATIONS

The United States Army should:

1. Emphasize the fact that tactical mobility is an effect of tactical unity. This implies a well thought-out division of responsibilities between engineer and maneuver units. It also implies increased emphasis on combined arms breaching drills as outlined in emerging doctrine (FC 90-13-1).

2. Establish a higher training priority for reconnaissance, countermine, counterobstacle, countermobility, and gap crossing operations in support of division maneuver exercises. Division training guidance and mission essential task lists should reflect this priority. Specific tasks which require more work are: placement and use of obstacle free zones, combined arms organization and training of reconnaissance elements, combined arms planning of mobility support operations (especially during the intelligence preparation of the battlefield, recognition and identification of obstacles, mine awareness (assessing kills during training), and the use of expedient methods.

3. Establish the necessary degree of specialization within engineer units as dictated by a unit's contingency missions. For example, to compensate for the shortage of assault gap crossing means in Europe, conduct a detailed assessment of gap crossing requirements. If expedient methods are deemed necessary, purchase the required material for training as well as actual wartime use. Specialization in other areas can be achieved through training.

4. Establish doctrine for organizing and employing standard counterobstacle teams from corps as well as divisional engineer assets. Establish planning factors which will streamline the estimate process by relating the threat to the number of counterobstacle teams required (i.e. one team required for two battalion-sized avenues of approach).

FIGURE 1: Soviet Engineer Task Organizations

A. Mobile Obstacle Detachment

1. Recon and Path Marking Element

- 1 Truck/APC with one half engineer squad
- 1 - path marking kit
- 1 Anti-tank officer assigned from AT force element

2. Obstacle Construction Element

- 3 Trucks with minelaying trailers
- 1 Truck with engineer squad with explosives
- 1 Bulldozer
- 2-3 Trucks with mines

3. Support Element

- 1 Anti-tank platoon (3 AT weapons)
- 1 Motorized rifle platoon with Sagger/SPG-7

B. Movement Support Detachment

1. Road and Bridges Element

- 2-4 Scissors bridges
- 1 Bulldozer
- 1 Crane/bucket excavator vehicle
- 1 Truck/APC with engineer squad
- 1 APC with motorized rifle squad

2. Route Marking Element

- 1 Motorized rifle platoon (3 APCs) with path marking kit

C. Recon and Obstacle Clearing Detachment

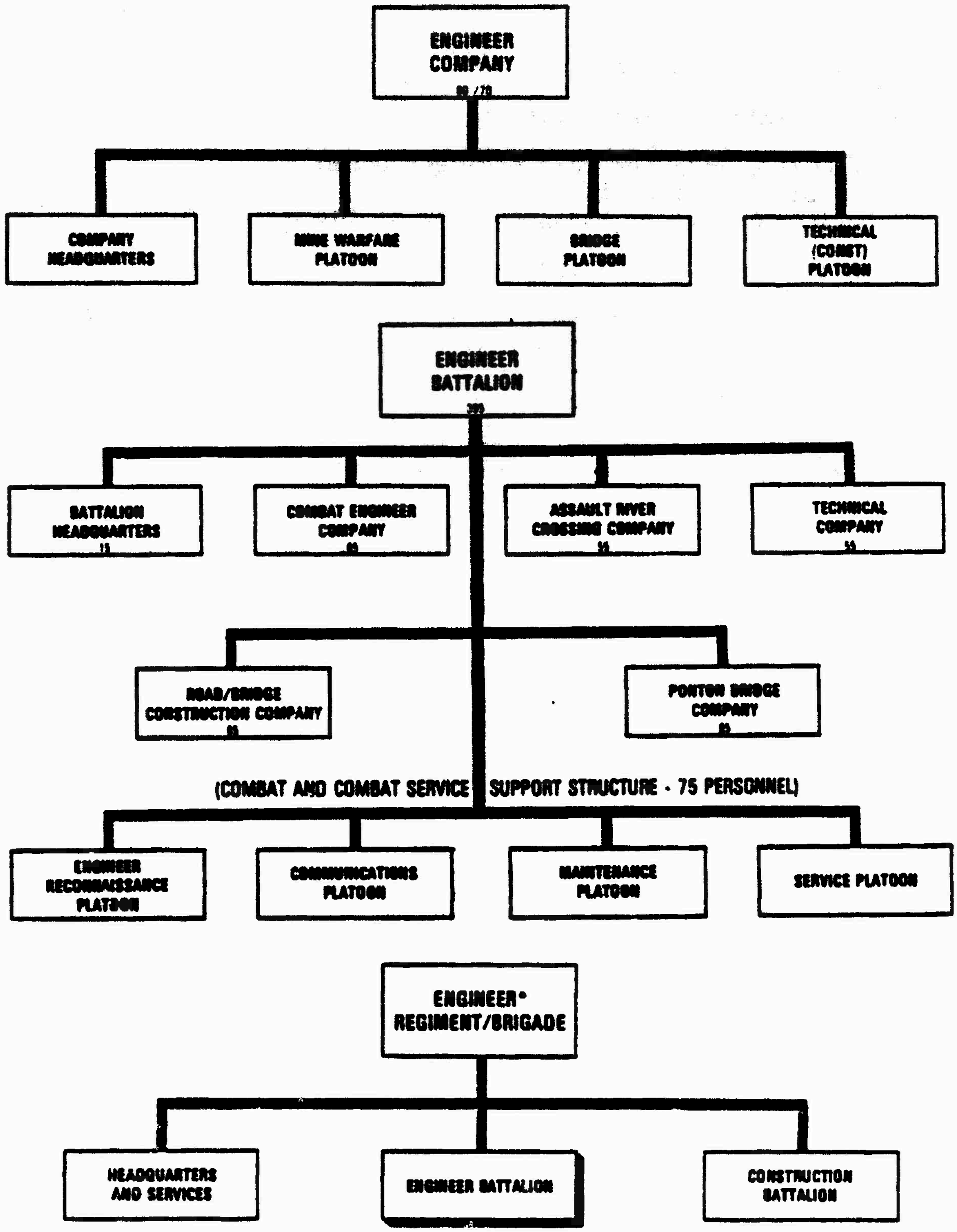
- 1 Battle Tank with mine plow
- 1 AVLB
- 1 APC with engineer squad with explosives, mine clearing device, mine detection equipment
- 1 BRDM (NBC recon version) with NBC squad

D. Engineer Recon Patrol

- 1 NCO
- 3 Enlisted Men

Reference: See Endnote 59.

FIGURE 2: <u>Soviet Engineer Organizations</u>



Reference: See Endnote 60.

Figure 3: Soviet Engineer Missions

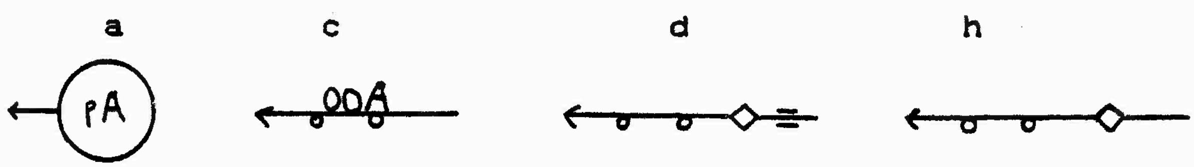
This figure outlines Soviet engineer missions under the headings of March, Defense, and Offense. Within each heading, missions are listed according to their tactical and technical parameters.

This figure has been omitted in order to allow widest distribution of this monograph. This figure is part of a translation of a Soviet document and is classified For Official Use Only due to copyright laws.

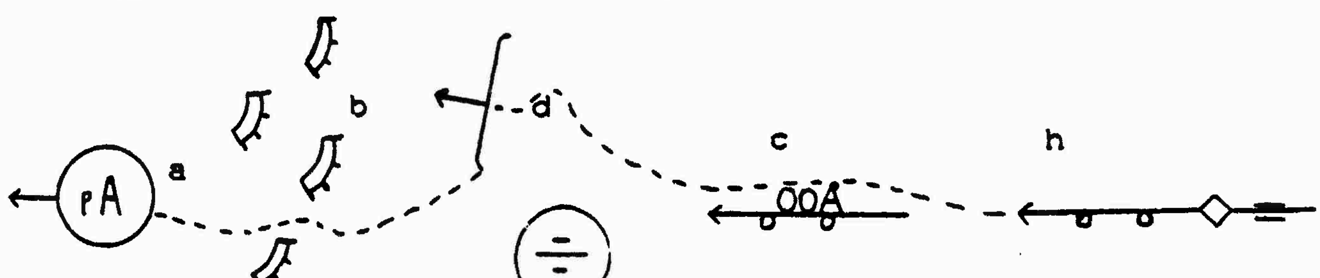
See endnote 61 for the reference in which this figure appears.

FIGURE 4: Deployment of the OOD in the Attack

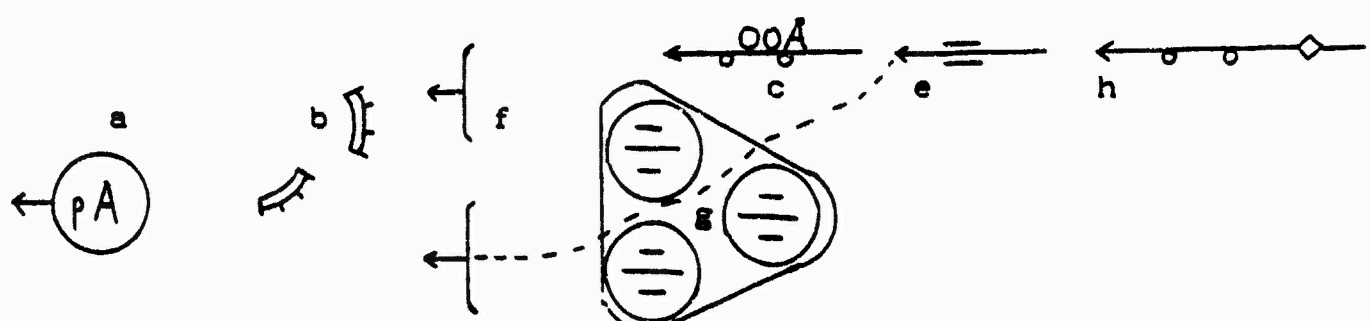
A. On the March



B. Approaching enemy positions in pre-battle order



C. In the assault



Key: (a)-strong armored recce patrol
(b)-enemy defenses
(c)-OOD
(d)-divisional vanguard (motorized rifle battalion, tank company, artillery battalion)
(e)-main forces
(f)-first echelon in the assault
(g)-deployed artillery battalions
(h)-second echelon

Reference: See Endnote 62.

FIGURE 5: Soviet Offensive Planning

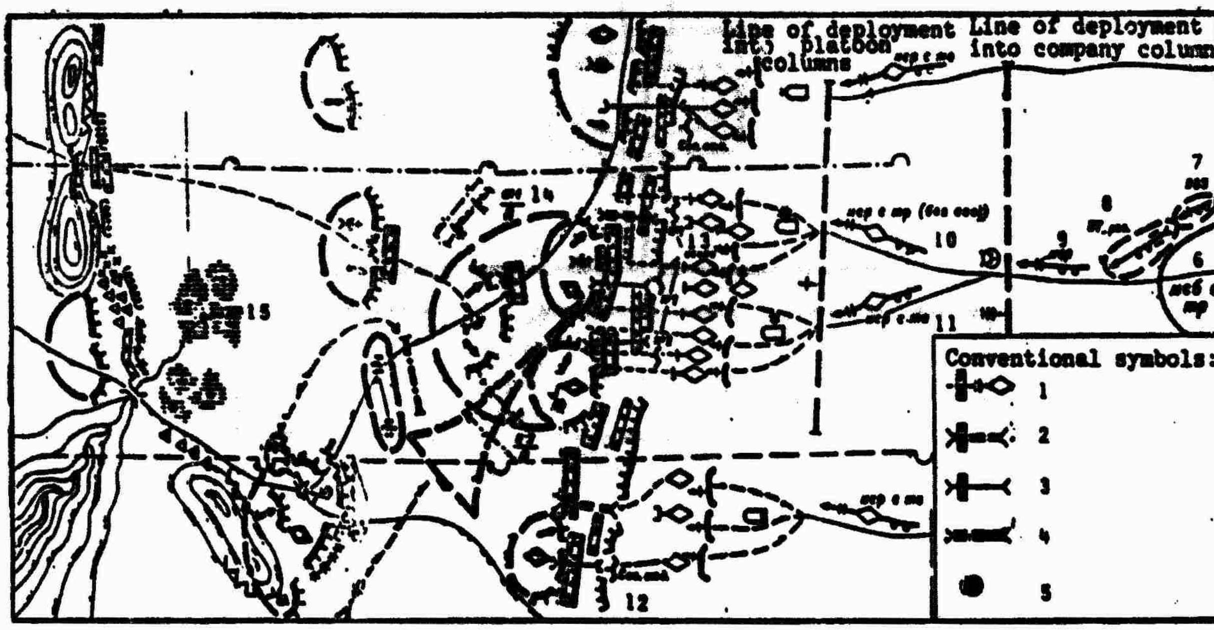
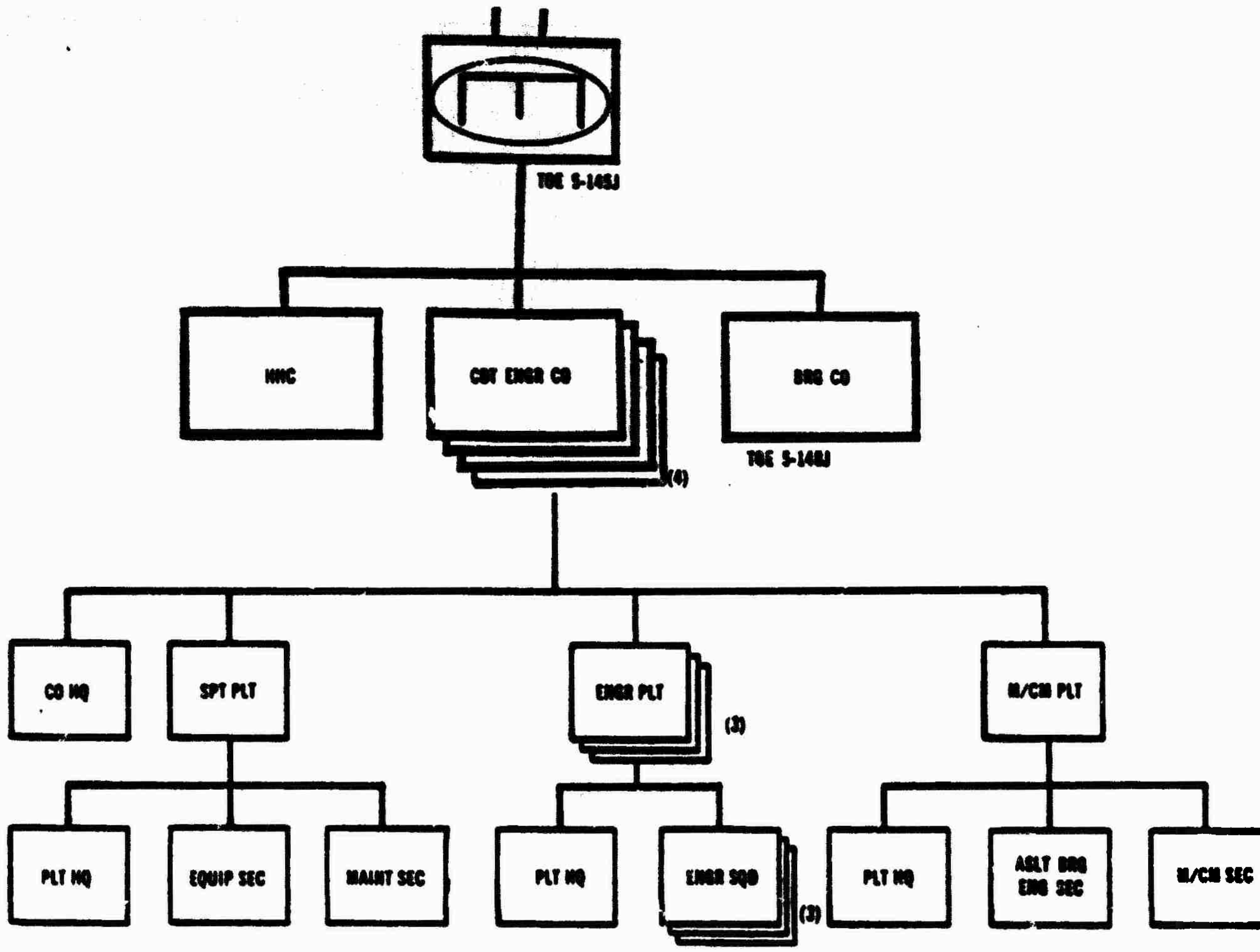


Diagram of engineer support to motorized rifle battalion actions in breakthrough of enemy defenses

KEY:
1. Places for tanks with individual mine-clearing attachments to cross mine field
2. Track lane made by tank with KMT-5 roller mine-clearing device
3. Passage made by detonation of mine-clearing charge
4. Passage widened by tank with mine-clearing device
5. Location for mounting roller mine-clearing devices
6. Msb [motorized rifle battalion] with tr [tank company]
7. POZ [mobile obstacle detachment]
8. PT [antitank] reserve
9. Msr [motorized rifle company]
10. Msr with tr (less platoon)
11. Msr with tv [tank platoon]
12. Combat engineer squad
13. Combat engineer platoon
14. P [exact meaning unknown]
15. Spring

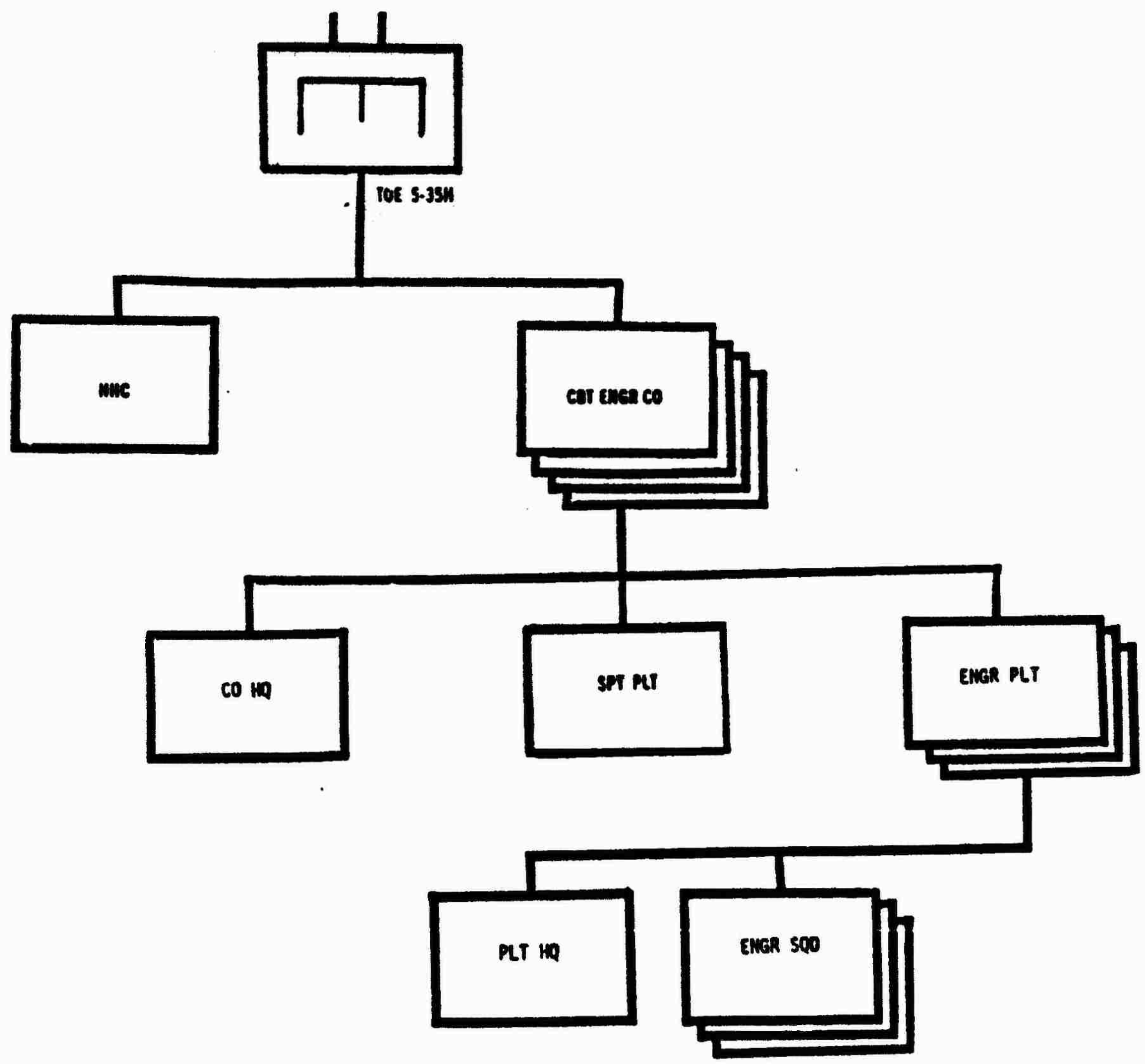
Reference: See Endnote 63.

FIGURE 6: U.S. Divisional Engineer Battalion Organization



Reference: See Endnote 64.

FIGURE 7: U.S. Corps Combat Engineer Battalion Organization



Reference: See Endnote 65.

FIGURE 8: Survey Data

The following data reflects input from two sources:

1. Responses (7) to a survey conducted of divisional units (2 page "Mobility Questionnaire" - figure 8a), and

2. a personal screening of divisional Mission Essential Task Lists (part of annual training guidance), copies of which are located in the Training Section, Department of Resource and Sustaining Operations (DSRO), U.S. Army Command and General Staff College.

The data is organized as follows:

Figure 8a: Mobility Questionnaire

Figure 8a is a copy of the questionnaire with major recurring comments listed.

Figure 8b: METL Review - figure 8b

Figure 8b is a summary of findings obtained from a review of 7 divisional training guidance letters.

FIGURE 8a: Mobility Questionnaire

1. Does your unit form combined arms obstacle breaching teams to sustain the momentum during offensive operations?

- platoon of engineers as breach element
- task organized to support company teams as situation dictates
- 50% stated no

2. Are mobility tasks on the division METL?

- yes, but not practical; only trained during force-on-force exercises
- yes, but not conducted as drills
- most stated no

3. How often are mobility tasks trained as part of a combined arms training exercise?

- CALFEXs, BN size or larger exercises
- Quarterly
- every opportunity (1 response)

4. How are engineer forces task organized to support mobility operations (and what command/support relationship is used)?

- engineer platoon per company team; company commander is TF engineer
- engineer company DS to Brigade
- engineer company OPCON to lead TF

5. During training exercises, how are "kills" assessed when friendly forces encounter minefields?

- observers use "God Gun" if MILES is used
- rarely is it done
- kills are never assessed
- minefields are not played

6. Are obstacles played realistically during training exercises (or are they ignored in the interest of time)?

- minefields are installed, but not played

- only wire obstacles and tank ditches are played realistically

- only played at the NTC

7. How many AVLBs and CEVs are in the division?

- all but one had full complement of 16 AVLBs and 8 CEVs

8. Who controls the employment of AVLBs and CEVs during mobility operations?

- BDE engineer allocates, TF engineer controls

- DIV level: engr BN S3; BDE level: BDE engr; TF level: TF engr

- DS engr platoon leader

9. Do you feel engineer support is responsive (sustains tempo) to the mobility needs of your division? If not, what problems are you experiencing (lack of assets, overtaxed engineers, mobility differential of equipment, etc.)?

- no, mobility of AVLBs and CEVs not matched with M1

- no, lack of breach drills

- no, need sapper M113 like Canadians and a smaller CEV

- no, need workable breaching systems (from march) - proposed COV is too slow and heavy

10. What other training problems have you encountered in supporting offensive maneuver operations?

- differing lane marking SOPs between brigades

- lack of MILES transmitters for CEV

- lack of demo, mines, breach drills

- annual class V allocations are too low

- offensive training is not supported by TASC (lack of MICLIC trainers)

- lack of integration of obstacle free zones with counterattack plans

FIGURE 8b: METL Review

Findings:

	Of 7 Reviewed: Number of Divisions
1. Top priority training tasks are:	Eurcpe - Defense CONUS - Deploy
2. Offensive operations are listed as a priority training task.	2
3. Obstacle breaching is listed as a priority training task.	7
4. Combined arms training of obstacle breaching is emphasized in training guidance.	2
5. Reconnaissance is listed as a priority training task.	0

FIGURE 9: Summary of NTC Lessons Learned

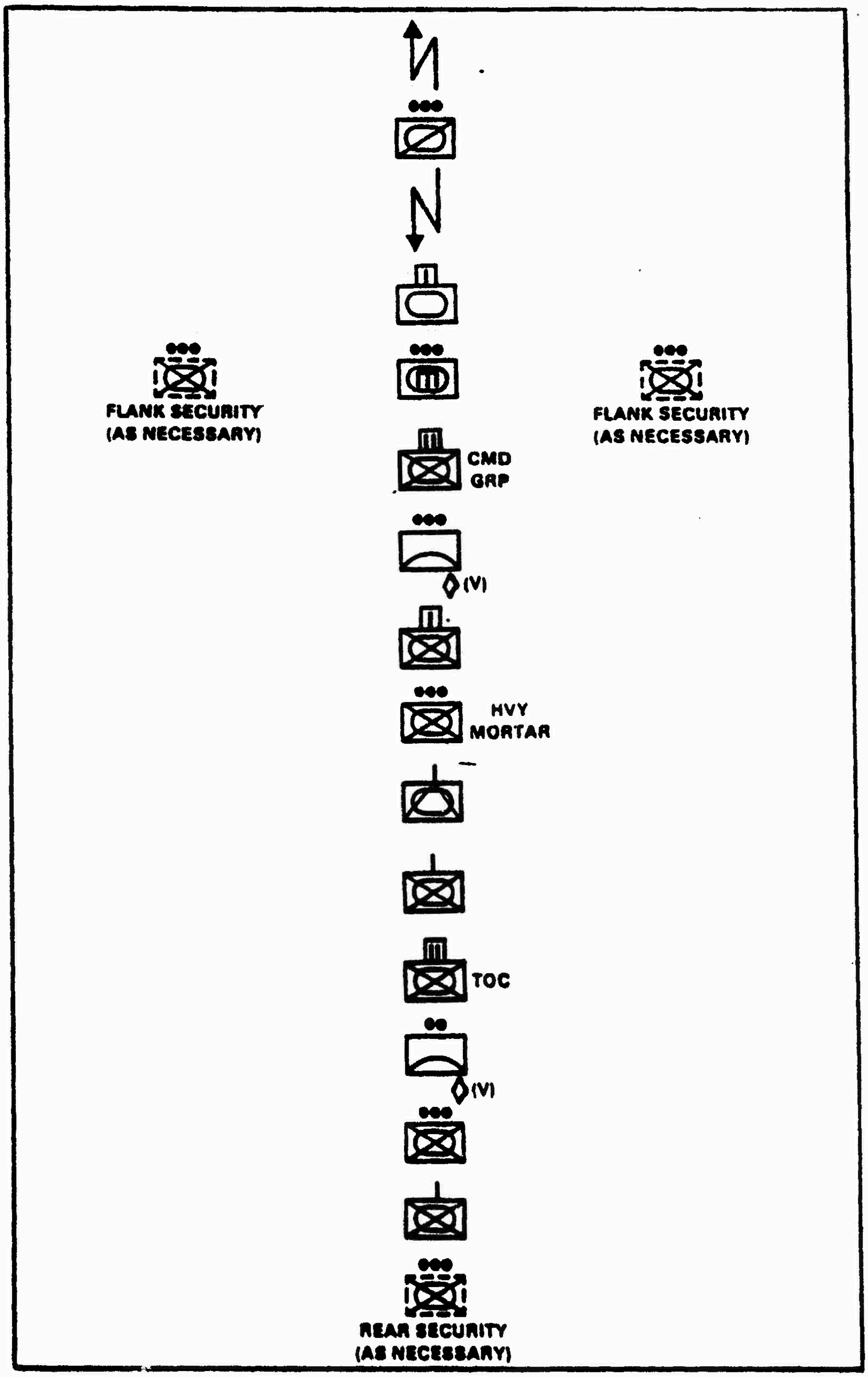
After-action Reviews for NTC rotations conducted during FY 1986 were reviewed and the following comments extracted. Only recurring problems are listed.

MISSIONS: Task force movement to contact and attack

* No engineers with scouts for reconnaissance
* Engineer not involved in planning
* Lack of marking equipment for minefields - maneuver force could not find the breach
* Engineers placed too far forward without protection - high casualties taken (fratricide too - maneuver could not identify engineers)
* Task force and supporting engineers failed to link up during movement
* No rehearsals (breaching) conducted - need drills (combined arms)
* No maneuver force breach teams/breaching capability (training)
* Engineers too far to the rear - lead element lacked ability to get engineer forward fast enough - unit stalled at obstacle and engineers took casualties while moving unprotected

Reference: See Endnote 66.

FIGURE 10: U.S. Movement to Contact (Task Force)

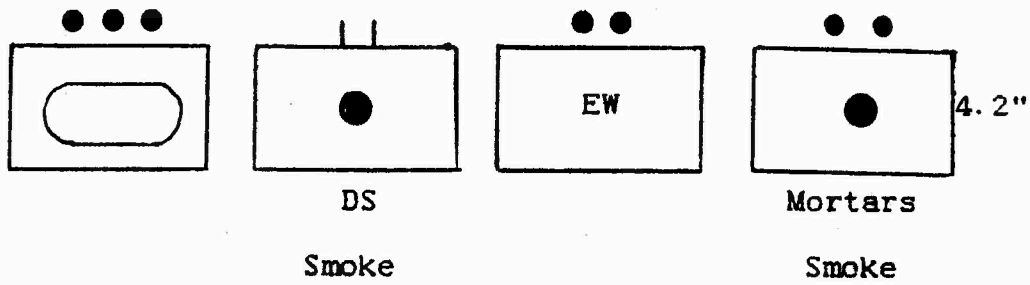


Reference: See Endnote 67.

FIGURE 11: U.S. Organization For Breaching (FC 90-13-1)

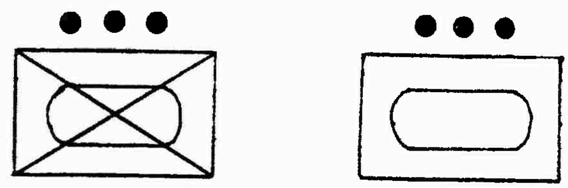
Recon Element - 2 Engineer NCOs with scouts

Support Force - (Smoke, EW, FA considered also)

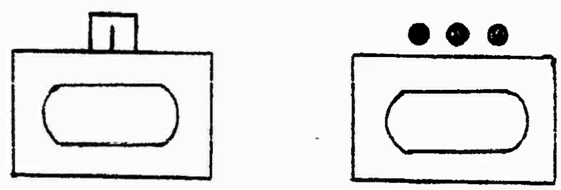


Assault Force - (armor, infantry)

= Breach Team



Breaching Force - (armor, engineer, infantry)



2 Tank platoons with 2 blade tanks or 2 mech infantry PLT
1 roller w/ CLAMS with AT assets
AT company

1 Engineer platoon with 1 CEV
2 M9 ACE
1 or 2 AVLB
2 MICLIC (towed)
M113s for command/control
Dump trucks for haul

Reference: See Endnote 68.

FIGURE 12: Breaching Capability Comparison

	U.S.	Soviet
Maneuver Forces		
Division (armored/tank)		
Number of Personnel	16,951	11,470
Number of Combat Vehicles (tanks, ACV)	672	754
Offensive Doctrine		
Division		
Number of Breach Lanes	2/TF	1-2/Co
Engineer Forces		
Division		
Number of Personnel (Div Bn)	890	395
Number of Personnel (Regt Co)	0	3 @ 70=210
Total (% of Div Personnel)	890 (5.25%)	605 (5.27%)
Non-Division (corps/army)		
Number Personnel (Bn)	855	395
Equipment (See Figure 13 for item comparison)		
Division (density is per tank unit)		
Number of rollers (density)	18 (3/Bn)	30 (1/Co)
Number of mine plows (density)	0	90 (1/Plt)
Number of blades (density)	0 (M1)	24 (1/Co)
Number of assault bridges (density)	16 (2/Bn)	34 (1/Co)
Task Organization of Engineers (using Div assets)		
Number of POZ	0	5
Number of OOD	0	5
Number of Mobility teams	8	0
Total	8	10

Reference: See Endnote 69

FIGURE 13: Engineer Equipment Comparison

	Organic to Div Bn U.S.	Organic to Div Bn Soviet	Organic to Non-Div Bn U.S.	Organic to Non-Div Bn Soviet
Counterobstacle/countermine				
Armored Engineer Tractor	-	2 IMR	-	2 IMR
Cbt Engineer Vehicle (Demo Gun)	8 CEV	-	-	-
Combat Dozer	25 M9	12 BAT	14 M9	3 BAT
Wheeled Dozer	-	/PKT	-	/PKT
Towed Line Charge	M173	-	M173	-
Mine Roller	18 Tank Mtd	30 KMT5	-	-
Mine Plow	-	90 KMT4/6	-	-
Tank Mtd Dozer Blade	18 M60A3	12 BTU	-	-
Mineclearer	-	2 BTR50	-	2 BTR50
Gap Crossing				
Armored Vehicle Launched	16 AVLB	10 MTU	-	4 MTU
Truck Launched Bridge	-	24 KMM/TMM	-	8 TMM
Tracked Amphibious Transporter	-	13 PTS2/K61	-	6 PTS
Personnel Carriers	48 M113	17 BTR60	-	2 BTR60
Countermobility				
Towed Minelayer	-	12 PMR3	-	3 PMR3
Self-Propelled Minelayer	-	3 GMZ	-	1 GMZ
Helicopter Minelayers	M56	HIP	M56	HIP
Mine Scatter System	4 GEMSS	-	4 GEMSS	-

Reference: See Endnote 70.

FIGURE 14: Mobility Capabilities Comparison

	U.S. Engineer Organization	Time	Soviet Engineer Organization	Time	Advantage
Counterobstacle/countermine					
Minefield (100m x 8m)	Tank w/ roller	5 min	Tank w/ roller	5 min	-
Minefield (180m x 6m)	APC w/ MICLIC	5 min	BTR50 w/line charge	10 min	U.S.
Minefield (100m x 8m)	Mobility Team	60 min	OOD	60 min	-
Anti-tank ditch (ditch)	1-CEV, 1-M9	10 min	IMR, BTU, BAT	10 min	-
Point Obstacle	1-CEV, 1-squad	10 min	1-BTU, 1-BAT	10 min	-
Gap Crossing					
Assault	1-AVLB (17m)	3 min	1-MTU (20m)	3 min	-
Fixed	1-MGB, PLT (31.4m)	150 min	4-TMM (40m)	80 min	Soviet
Countermobility					
Minefield (.75-0-0)	1-PLT, M57	30 min	3 GMZ, PMR	15 min	Soviet
Minefield (1.5-0-0)	1-PLT, M57	80 min	" "	105 min	U.S.
Minefield (1000x300)	3-M56	30 min	HIP	50 min	U.S.
RAAM	1-FA btry	2 min	?	?	-
ADAM	"	2 min	?	?	-
GEMSS (800x60)(1-0-0)	2-Squads, GEMSS	30 min	-	-	U.S.

Reference: See Endnote 71.

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